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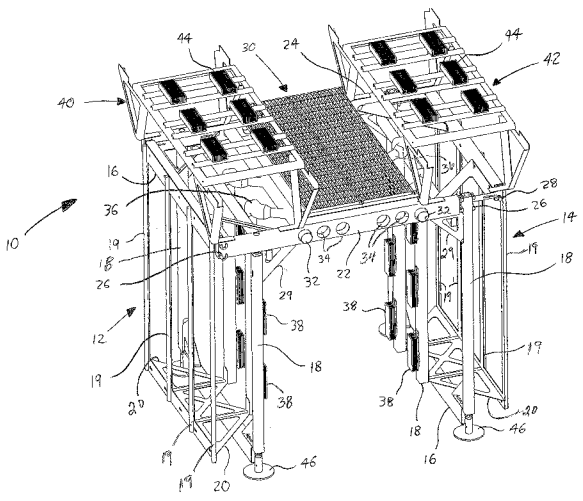
(54) **Title:** DEVICE FOR STORING AND MAINTAINING COMMUNICATIONS EQUIPMENT FOR CABLE TELEVISION



(57) **Abstract:** A head-on or modular structure for storing audio/video/telecommunications hardware and associated components includes a first support framework including an upper portion, a lower portion and a first plurality of cable guides mounted in a substantially vertical orientation thereon, and a second support framework including an upper portion, a lower portion and a second plurality of cable guides mounted in a substantially vertical orientation thereon. A first and second cross-member each adjoin the first and second support frameworks in a substantially perpendicular relation thereto near the respective upper portions thereof, and a walkway adjoins the first and second cross-members. An HVAC system is integrated into the modular structure. The modular structure can be used as a stand alone unit or adjacent modular structures can be joined together in the horizontal and/or vertical orientation.

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DEVICE FOR STORING AND MAINTAINING COMMUNICATIONS EQUIPMENT FOR CABLE TELEVISION

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of United States Provisional Application No. 60/850,110, entitled "DEVICE FOR STORING AND MAINTAINING COMMUNICATIONS EQUIPMENT FOR CABLE TELEVISION" filed on October 6, 2006, which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a head end, and more specifically, to a modular structure for efficiently housing telecommunications hardware and routing associated cables therethrough.

Description of Related Art

[0003] Cable television was once primarily a medium for handing off broadcast signals to an audience out of the range of mostly urban transmitters. However, cable television is now recognized as the dominant broadband medium within the United States, providing more than just network and public access channels to its huge subscriber base. Cable television customers are now offered additional services such as high-speed Internet access, pay-per-view, remote learning, high-speed multi-player gaming, digital music services, cable telephony service, and video-on-demand.

[0004] As a result of the addition of the aforementioned expanded services, head-end real estate has become a scarce commodity within head-end facilities, or other facilities designed to house the requisite telecommunications hardware for implementing these services. The cable television industry and related telecommunications industries currently employ traditional racking systems that are inadequate in addressing the storage and maintenance needs of the hardware associated with the growing cable services.

[0005] For example, current racking systems or head-ends do not allow for vertical expansion, as implementation thereof utilizes a two-dimensional approach. Specifically, an area within the head-end is designed to accept individual cabinets or floor-mounted racks to a certain level. Generally, the area above a seven foot height non-assisted reachable level is designed to accept either a floor-based tray structure, or accept a ceiling or roof-suspended tray structure. Such tray structures are intended to facilitate power and data cabling.

Installation of the power and data cabling is awkward as an installer is required to use a floor-based ladder and reach over the cabinets or racks. Additionally, use of ordinary tray structures may result in negative cable management issues, as the cables may overlap or become tangled. It is evident that awkward installation configurations are not conducive to providing an efficient and reliable solution for operating and maintaining the equipment situated thereon. Specifically, maintenance of hardware, specifically hardware anticipated to fail, such as servers, is crucial to operations in the cable industry. Additionally, the prior art generally utilizes fan-based cooling solutions for servers, which, upon failure, may result in overheating of the servers and processing errors or server failure altogether. As cable providers begin to offer new services by adding new equipment, the frequency of maintenance is anticipated to rise. Since time is of the essence when resolving a maintenance issue, as television, Internet, telephone, security, and other cable services may be interrupted, efficient replacement of hardware is critical.

[0006] However, the prior art head-ends utilize antiquated installation configurations which are not conducive to sustainable increased maintenance efficiency. Thus, not only may prior art racking systems be considered inadequate to accommodate existing hardware installations, but the limitations inherent in the prior art racking systems prevent such racking systems to adequately address the storage and maintenance requirements associated with future expanded services hardware installations. Accordingly, current racking system or head ends are insufficient for the quality of service that customers will demand for these services today and in the future.

SUMMARY OF THE INVENTION

[0007] The present invention is a modular structure for storing audio/video/telecommunications hardware and associated components therein. The structure includes (a) a first support framework having a first plurality of cable guides mounted in a substantially vertical orientation thereon, wherein the first support framework includes an upper portion and a lower portion; (b) a second support framework having a second plurality of cable guides situated in a substantially vertical orientation thereon, wherein the second support framework includes an upper portion and a lower portion, wherein the first support framework is situated in a spaced parallel relation to the second support framework; (c) a first and second cross-member each adjoining the first and second support frameworks in a substantially perpendicular relation thereto near the respective upper portions thereof; (d) a walkway adjoining the first and second cross-members; and (e) an HVAC system integrated into the modular structure.

[0008] Accordingly, the present invention provides a functional storage and maintenance solution for audio/video and telecommunications hardware that is also conducive to providing efficient facility space management within a head-end facility. The present invention allows for expedited and simplified installation thereof, requiring a reduced amount of labor in terms of hours and manpower. The present invention offers increased accessibility to stored hardware by providing integrated cable management and a walkway. Additionally, the present invention provides integrated power and Heating Venting Air Conditioning (HVAC) services to the hardware stored thereon. Accordingly, the present invention significantly reduces labor costs and increases safety levels for both labor and equipment.

[0009] Still other desirable features of the invention will become apparent to those of ordinary skill in the art upon reading and understanding the following detailed description, taken with the accompanying drawings, wherein like reference numerals represent like elements throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a front perspective view of a non-limiting embodiment of a head-end or module structure of the present invention;

[0011] FIG. 2 is a front perspective view of a plurality of head-ends or module structures of FIG. 1 interconnected along a horizontal orientation, in accordance with the present invention; and

[0012] FIG. 3 is a front perspective view of a plurality of head-ends or module structures of FIG. 1 interconnected in a stacked configuration, in accordance with the present invention.

[0013] FIG. 4 is an end view having portions removed for purposes of clarity of another non-limiting embodiment of the head-on or module structure of the invention.

[0014] FIG. 5 is a partial side view of the head-on or module structure of FIG. 5.

[0015] FIG. 6 is a magnified view of the area circled in FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] For purposes of the description hereinafter, spatial or directional terms shall relate to the invention as it is oriented in the drawing figures. However, it is to be understood that the invention may assume various alternative variations, except where expressly specified to the contrary. It is also to be understood that the specific apparatus illustrated in the attached drawings, and described in the following specification, is simply an exemplary embodiment of the invention. Hence, specific dimensions and other physical characteristics related to the embodiments disclosed herein are not to be considered as limiting.

[0017] FIGS. 1-3 depict, in accordance with a desirable embodiment of the present invention, a modular structure 10 for storing audio, video, and/or telecommunications hardware and associated components therein in a manner discussed below. The modular structure 10 may therefore be utilized as a head-end unit in a cable television plant or other industry facilities housing head-ends. For example, the present invention may also be utilized by any entity housing a server farm including, but not limited to financial institutions, telecommunications companies, Internet service providers, universities, and government agencies.

[0018] The modular structure 10 includes various components, as shall be discussed in greater detail hereinafter. Due to the industrial nature of the present invention, such components are intended to offer stability and strength in fulfilling the functional aspects relating to the modular structure 10. Accordingly, the structural components may be constructed of rigid material, such as steel or other suitable metals. Similarly, non-structural components intended for increased interaction therewith may be constructed of material sufficient to withstand repeated use within an industrial environment. For example, bent sheet metal or hardened plastics may be used to provide stability while also reducing the weight of the components. One of ordinary skill in the art would have sufficient knowledge, based upon the application of the present invention, in the specific materials to be used in the construction thereof. However, it is to be understood that the selection of specific materials is not to be construed as limiting the present invention.

[0019] In the desirable embodiment, as shown in FIG. 1, the modular structure 10 includes a first support framework 12 and a second support framework 14 situated in a spaced parallel relation to each other. The first and second support frameworks 12, 14 are spaced sufficiently apart to allow freedom of movement of head-end facility staff therebetween as well as to provide sufficient space for storing and maintaining the hardware. Desirably, the first and second support frameworks 12, 14 are substantially similar in construction. Specifically, each of the support frameworks 12, 14 embody a substantially rectilinear framework arrangement constructed of horizontal cross-members 16 and vertical cross-members, e.g. vertical inner cross members 18, and vertical outer cross members 19. Additionally, the support frameworks 12, 14 may include angled brackets 20 or other supports to provide strength and stability to the frameworks 12, 14 and surrounding structural components. The support frameworks 12, 14 are sized to accommodate cabinet servers and rack mount servers 21 between the vertical cross-members 18 and 19 thereof (servers 21 shown in FIGS. 4 and 5). Thus, it is to be understood that standard-sized hardware or

housing thereof used in conjunction with traditional head-ends in head-end facilities may be secured to the support frameworks 12, 14. For example, attachment ends of rack mount hardware or servers may be secured to two respective cross-members 19 of the support frameworks 12, 14. Due to the openness of the framework arrangement, the hardware may be mounted in various orientations, including but not limited to horizontal and vertical, by utilizing additional brackets, supports, cross-members, or other suitable mounting hardware. Thus, the framework arrangement of the support frameworks 12, 14 illustrated in the accompanying figures is not to be construed as limiting the invention.

[0020] The modular structure 10 also includes a first cross-member 22 and a second cross-member 24 adjoining the support frameworks 12, 14 in a substantially perpendicular relation thereto. Specifically, the cross-members 22, 24 are situated near a top portion of each of the support frameworks 12, 14. The cross-members 22, 24 may be secured to the support frameworks 12, 14 in variety of configurations utilizing a variety of securing hardware. In the desirable embodiment, one end of each of the first and second cross-members 22, 24 is secured along a side edge of the second support framework 14. The free end of each of the first and second cross-members 22, 24 is attached over the top portion of the first support framework 12. The resultant assembly in this particular embodiment causes the support frameworks 12, 14 to be offset in relation to the cross-members 22, 24. This assembly allows the modular structure 10 to be secured to another modular structure of substantially similar construction as the modular structure 10. Accordingly, components such as the support frameworks 12, 14 and the cross-member 22, 24 may include channels 26, protrusions 28, or other functionally equivalent interlocking structures that are designed to connect with corresponding interlocking structures situated on other modular structures. The modular structure 10 may also include additional support hardware, such as support brackets 29, secured to the cross-members 22, 24 and the support frameworks 12, 14, to provide additional strength and rigidity to the modular structure 10.

[0021] The modular structure 10 also includes a walkway 30 adjoining the first and second cross-members 22, 24. In the desirable embodiment, the walkway is a two-piece rectilinear metal grate arrangement spanning the cross-members 22, 24 in a substantially perpendicular orientation thereto. It is to be understood that the walkway 30 may be a unitary piece or may be sized and shaped to accommodate an available surface area between the cross-members 22, 24. For example, the walkway 30 is shown in FIGS. 1-3 to only span a partial length of the cross-members 22, 24. In the desirable embodiment, the walkway 30 is supported upon the cross-members 22, 24, however, it is to be understood that the walkway 30 may be

secured to the modular structure 10 in other ways. For example, the walkway 30 may be secured between the cross-members 22, 24 or attached to an underside thereof. It is to be understood that the term "walkway" is not to be construed as limiting the functionality imparted on the walkway 30. For example, the walkway 30 may server as a platform, mezzanine, or elevated level in relation to a ground surface upon which the modular structure 10 is positioned. Additionally, it is to be understood that an individual situated on the walkway 30 is not limited to walking thereon. Desirably, the walkway 30 is situated at least seven feet above the ground surface, so that the individual may easily pass underneath the walkway 30.

[0022] The modular structure 10 may further include an integrated Heating Venting Air Conditioning (HVAC) arrangement integrated therein. The HVAC arrangement includes one or more conduits 32, such as piping or sealed channels, supported by the cross-members 22, 24. Desirably, the conduit 32 is positioned in a substantially parallel relation to each of the support frameworks 12, 14. The conduit 32 may be secured to the cross-members 22, 24 by utilizing various securing techniques and/or securing hardware. With respect to the desirable embodiment, the cross-members 22, 24 each include one or more cutouts 34 for supporting the conduit 32 therethrough. The cutouts 34 may be of various sizes and shapes to accommodate the corresponding shapes and sizes of the conduits 32. Desirably, the cutouts 34 are situated in series along the length of the cross-members 22, 24, however, it is to be understood that the cutouts may be situated in any suitable configuration. A duct arrangement 36 may be integrated in fluid communication with the conduit 32. Specifically, the duct arrangement 36 may branch from one or more points along the length of the conduit 32 and extend downwardly therefrom along any of the support frameworks 12, 14 or in substantially parallel relation thereto. An open end of the duct arrangement 36 may be positioned near or focused on an area adjacent to a heat-producing source of the audio, video, and/or telecommunications hardware 21. Alternatively, the open end of the duct arrangement 36 may be integrated with the hardware. Accordingly, the conduit 32 in conjunction with the duct arrangement 36 may control the ambient operating temperature of the hardware. For example, cool air may be transmitted through the conduit 32 from a central source to the modular structure 10 to cool the hardware secured thereon.

[0023] The modular structure 10 may also be adapted to support power cables 33 (see FIG. 3) necessary to satisfy the electrical requirements of the hardware stored within the modular structure 10. The cutouts 34 in the cross-members 22, 24 may be utilized to route power cables 33 therethrough. Alternatively, the power cables may be routed through conduits

similar to conduit 32, thereby concealing the power cables. The modular structure 10 may also include power receptacles 37 (power receptacles only shown in FIG. 5) secured thereto. For example, the power receptacles 37 may be attached to the support frameworks 12, 14, whereby the power cables may be directly connected to the receptacles. The modular structure 10 therefore provides an integrated power source, as the hardware 21 may be plugged into any available receptacle situated on the same support framework 12, 14 on which the hardware is stored.

[0024] The modular structure 10 also includes one or more cable guides 38 mounted in a substantially vertical orientation on one or both of the support frameworks 12, 14. Generally, the cable guides 38 are affixed to the vertical cross members 18 (see FIG. 1) such that cables and wiring (not shown) associated with the hardware may be routed from the hardware, through the cable guides, and to a point away from the hardware, such as the top or bottom of the modular structure 10. The cable guides 38 provide for efficient cable management such that cables may be grouped together and routed away from the modular structure 10. Similarly, the cable guides 38 may be used to route the cables to other areas of the modular structure 10. The cable guides 38 may be of any suitable construction for securing one or more cables therethrough. For example, the cable guides 38 may include a slotted or snap-in configuration adapted to for easy and efficient insertion and removal of the cables.

[0025] In the desirable embodiment, the modular structure 10 may also include one or more horizontal cable guide assemblies 40, 42 adjoining the cross-members 22, 24. Each cable-guide assembly 40, 42 may be configured as an open framework having additional cable guides 44 secured thereon. Each corresponding cable-guide assembly 40, 42 may be situated over the support framework 12, 14, respectively, and in a substantially parallel orientation thereto. Specifically, the cable guides 44 are adapted to receive cables in a parallel relation to the support frameworks 12, 14. Thus, cables routed through the cable guides 38 of the corresponding support framework 12, 14 may upwardly extend through a plane defined by the cross-members 22, 24, through the respective cable guide assemblies 40, 42, and through the respective cable guides 44. The cable guides 42 may be of the same construction as the cable guides 38

[0026] It is to be understood that through the placement of the cable guides 38, 44, the modular structure 10 may offer an unlimited number of routing configurations for the cables and wires. For example, although the cable guides 38 are shown to be situated along an interior portion of the modular structure 10, the cable guides may also be situated along an external portion thereof. Additionally, although the cable guides 38, 40 are shown to be

situated in a uniform and in-line orientation with respect to each other, the cable guides 38, 40 may be arranged in various orientations conducive to efficient cable management associated with a particular application.

[0027] The modular structure 10 may also include integrated leveling hardware for imparting a level orientation of the modular structure 10 with respect to the ground surface. In the desirable embodiment, one or more of the support frameworks 12, 14 may be outfitted with a telescoping foot 46 secured to a bottom portion thereof. It is to be understood that any equivalent hardware providing leveling functionality may be utilized in conjunction with the modular structure 10.

[0028] Although the modular structure 10 may be utilized as a standalone unit, the modular structure 10 is also designed to be used in conjunction with other substantially identical modular structures. It is to be understood that due to the modular design of the modular structure 10, an unlimited number of installations utilizing substantially identical modular structures 10 may be formed. More particularly and not limiting to the invention, FIGS. 2 and 3 depict exemplary embodiments of installations that may be constructed utilizing the modular structure 10.

[0029] For example, as shown in FIG. 2, a first installation 50 includes a plurality of modular structures 10 interconnected along a horizontal orientation. With respect to the modular structures 10 spaced in an east/west orientation (from right to left as viewed in FIG. 2), an interconnecting piece 52 connecting the respective frameworks of modular structures to be adjoined is utilized. With continued reference to FIG. 2, the interconnecting piece 52 utilizes the interlocking structures, such as the channels 26 and protrusions 28 on the respective modular structures 10, which are designed to connect with corresponding interlocking structures on the interlocking piece 52. The interlocking piece 52 may include a walkway 30 similar to that of the modular structure 10. With respect to the modular structures spaced in a north/south orientation, the respective modular structures 10 are positioned such that one cross-member 22, 24 of one modular structure 10 is situated adjacent to the other cross-member 24, 22, respectively of the other modular structure 10. The adjacent modular structures 10 may be secured to each other utilizing the respective interlocking structures situated on each of the modular structures 10, e.g. the adjacent modular structures 10 may be secured together by the channels 26 and the protrusions 28.

[0030] Another exemplary embodiment of an installation is shown in FIG. 3, wherein a second installation 60 includes a plurality of modular structures 10 interconnected in a stacked configuration. The modular structure 10 is stacked upon another modular structure

10 and secured thereto, such that the support frameworks 12, 14 of the top modular structure 10 are substantially parallel to the support frameworks 12, 14 of the bottom modular structure.

[0031] As can now be appreciated, the invention is not limited to the manner in which the module structures of the invention are secured together. Shown in FIGS. 4 and 5 is module structure 62 incorporating features of the invention. The module structure 62 is similar to the module structure 10 except that module structure 62 includes vertical cross members 64 and horizontal cross members 66 (only one shown in FIG. 5) that are different from the vertical cross members 18, and the first and second cross members 21, 22 of the module structure 10. More particularly, the horizontal cross member 66 of the module structure 62, in one non-limiting embodiment of the invention, has the cut outs 34, and has its ends 68 secured to the vertical cross members 64 of the module structure 62 by threaded fasteners 70 as shown in FIGS. 5 and 6. The vertical cross members 64 of the module structure 62 are similar to the vertical cross members 18 except that upper end 72 of the vertical cross members 64 is configured to capture end 74 of the threaded fasteners 70 to secure the horizontal cross member 66 between and to the upper end 72 of the vertical cross members 64 as shown in FIG. 5.

[0032] The module structures 62 are secured in the east/west direction (using FIG. 2 as a reference) by securing one end of interconnecting strut 76 to the upper end 72 of the vertical cross member 64 of one module structure 62, and securing the opposite end of the interconnecting strut 76 to the upper end of the vertical cross member 64 of the adjacent module structure 62. The module structures 62 are secured in the north/south direction by securing one end of interconnecting strut 78 (see FIG. 4) to the upper end 72 of the vertical cross member 64 of one module structure 62, and securing the opposite end of the interconnecting strut 78 to the upper end of the vertical cross member 64 of adjacent module structure 62. The ends of the interconnecting struts 76 and 78 can be fastened to their respective one of the vertical cross members 64 by the threaded fasteners 70 (see FIGS. 4-6) in a similar manner as the ends of the horizontal cross member 66 were secured to the vertical cross member 64.. In one non-limiting embodiment of the invention, the vertical cross member 64 has a square cross section for ease of securing the interconnecting struts 76 and 78, and the horizontal cross member 66 to the top end 72 of the vertical cross member 64.

[0033] Module structures 62 stacked one on top of the other as shown in FIG. 3 for the module structures 10 can be secured in position by a thread shaft 80 (see FIG. 6) having one end threaded into the upper end 72 of the vertical cross member 64 of the lower one of the

module structure 62, and the opposite end of the threaded shaft 80 threaded into lower end 82 of the vertical cross member 64 of the upper one of the module structure 62.

[0034] The above invention has been described with reference to the preferred and alternative embodiments. Obvious modifications, combinations, and alterations will occur to others upon reading the preceding detailed description. It is intended that the invention be construed as including all such modifications, combinations, and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.

THE INVENTION CLAIMED IS:

1. A modular structure for storing audio/video/telecommunications hardware and associated components therein, wherein the structure comprises:

a first support framework having a first plurality of cable guides mounted in a substantially vertical orientation thereon, wherein the first support framework includes an upper portion and a lower portion;

a second support framework having a second plurality of cable guides situated in a substantially vertical orientation thereon, wherein the second support framework includes an upper portion and a lower portion, wherein the first support framework is situated in a spaced parallel relation to the second support framework,

a first and second cross-member each adjoining the first and second support frameworks in a substantially perpendicular relation thereto near the respective upper portions thereof;

a walkway adjoining the first and second cross-members; and

an HVAC system integrated into the modular structure.

2. The modular structure of claim 1, further comprising at least one horizontal cable guide assembly adjoining the first and second cross-members.

3. The modular structure of claim 2, wherein the cable guide assembly includes a second plurality of cable guides for securing cables in a parallel relation to the first and second support framework.

4. The modular structure of claim 1, further comprising leveling means for imparting a level orientation of the modular structure with respect to a surface on which the first and second support frameworks are positioned.

5. The modular structure of claim 4, wherein the leveling means includes at least one telescoping leg situated on the bottom portion of each of the first and second support frameworks.

6. The modular structure of claim 1, wherein the first and second support frameworks are sized to accommodate one of a cabinet server and rack mount server therein.

7. The modular structure of claim 1, wherein the HVAC system includes at least one conduit supported by the first and second cross-members.

8. The modular structure of claim 7, wherein the at least one conduit is positioned in a substantially parallel relation to each of the first and second support frameworks.

9. The modular structure of claim 8, further comprising a duct arrangement extending along one of the first and second support frameworks.

10. The modular structure of claim 7, wherein the first and second cross-members are adapted to support power cables in a parallel relation to the first and second support framework.

11. The modular structure of claim 10, wherein the first and second cross-members each include a plurality of cutouts for supporting the at least one conduit and power cables therethrough.

12. The modular structure of claim 1, wherein the walkway is a grate arrangement.

13. The modular structure of claim 12, wherein the grate arrangement is situated at least approximately 7 feet above a surface on which the first and second support frameworks are positioned.

14. An installation for storing audio/video/telecommunications hardware and associated components therein, wherein the installation comprises:

a first modular structure including:

a first support framework having a first plurality of cable guides mounted in a substantially vertical orientation thereon, wherein the first support framework includes an upper portion and a lower portion;

a second support framework having a second plurality of cable guides situated in a substantially vertical orientation thereon, wherein the second support framework includes an upper portion and a lower portion, wherein the first support framework is situated in a spaced parallel relation to the second support framework,

a first and second cross-member each adjoining the first and second support frameworks in a substantially perpendicular relation thereto near the respective upper portions thereof; and

a walkway adjoining the first and second cross-members; and

a second modular structure, wherein the second modular structure is substantially identical to the first modular structure, wherein the second modular structure is connected to the first modular structure such that the first cross-member of the first modular structure is adjacent to one of a first or second cross-member of the second modular structure.

15. The installation of claim 14, further comprising an HVAC system integrated into the first and second modular structure and supported by the first and second cross-members of the first and second modular structures, respectively.

16. The installation of claim 15, further comprising a third modular structure, where the third modular structure includes:

a first support framework having a first plurality of cable guides mounted in a substantially vertical orientation thereon, wherein the first support framework includes an upper portion and a lower portion;

a second support framework having a second plurality of cable guides situated in a substantially vertical orientation thereon, wherein the second support framework includes an upper portion and a lower portion, wherein the first support framework is situated in a spaced parallel relation to the second support framework,

a first and second cross-member each adjoining the first and second support frameworks in a substantially perpendicular relation thereto near the respective upper portions thereof, wherein the third modular structure is stacked upon and secured to the first modular structure, wherein the first and second support frameworks of the first modular structure are substantially parallel to the first and second support frameworks of the third modular structure.

17. The installation of claim 16, wherein the first and second cross-members of the third modular structure each include a plurality of cutouts for supporting at least one of conduits and power cables therethrough.

18. The installation of claim 15, further comprising a third modular structure identical to the first modular structure, wherein the third modular structure is connected to the first modular structure via an interconnecting piece connecting the first framework of the third modular structure to the first framework of the first modular structure.

19. The installation of claim 18, wherein the interconnecting piece connecting the first framework of the third modular structure to the first framework of the first modular structure comprises a threaded fastener.

20. The installation of claim 15, wherein the first modular structure is on top of the second modular structure and secured in position by a plurality of threaded fasteners.

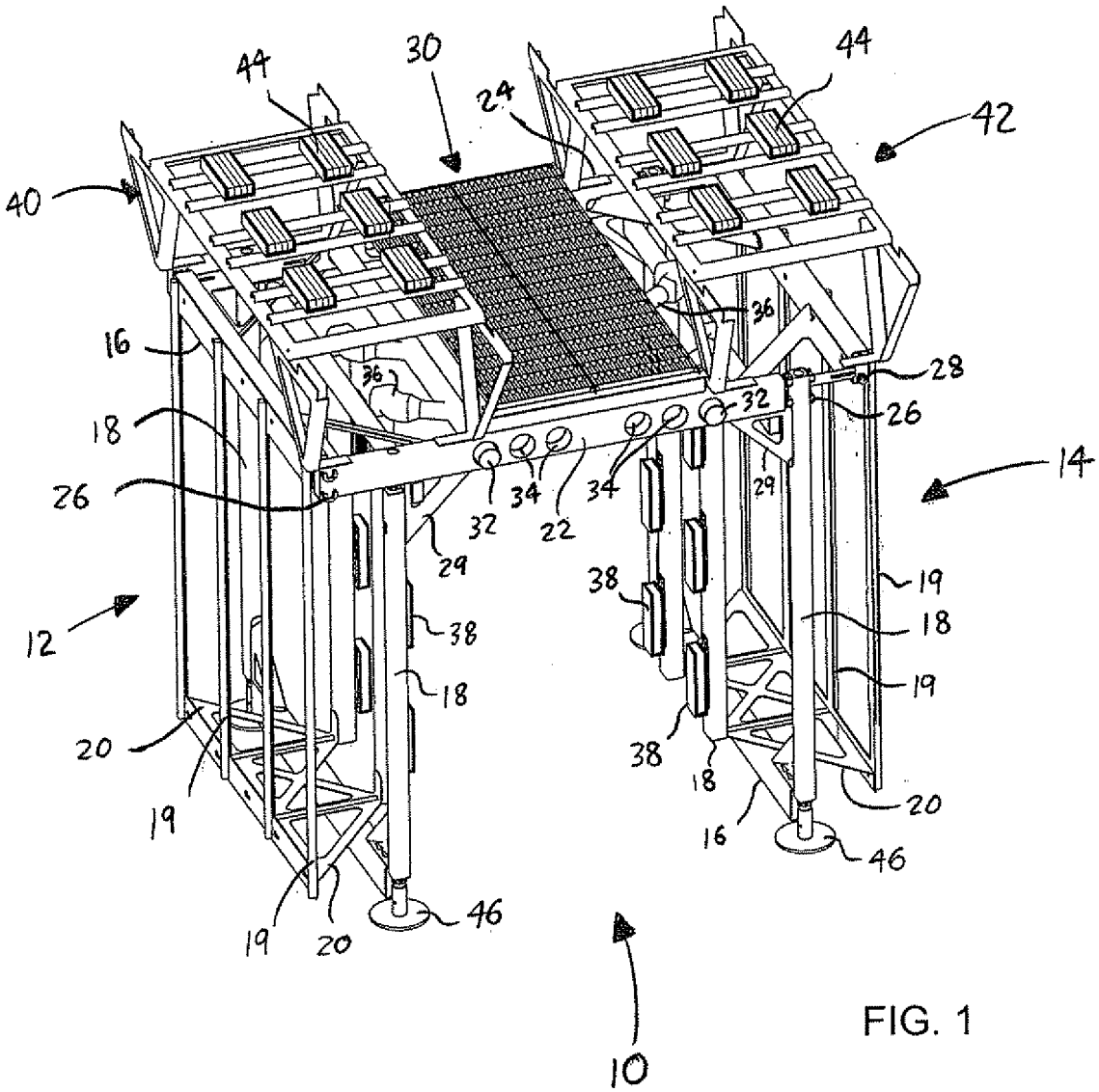
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FIG. 1

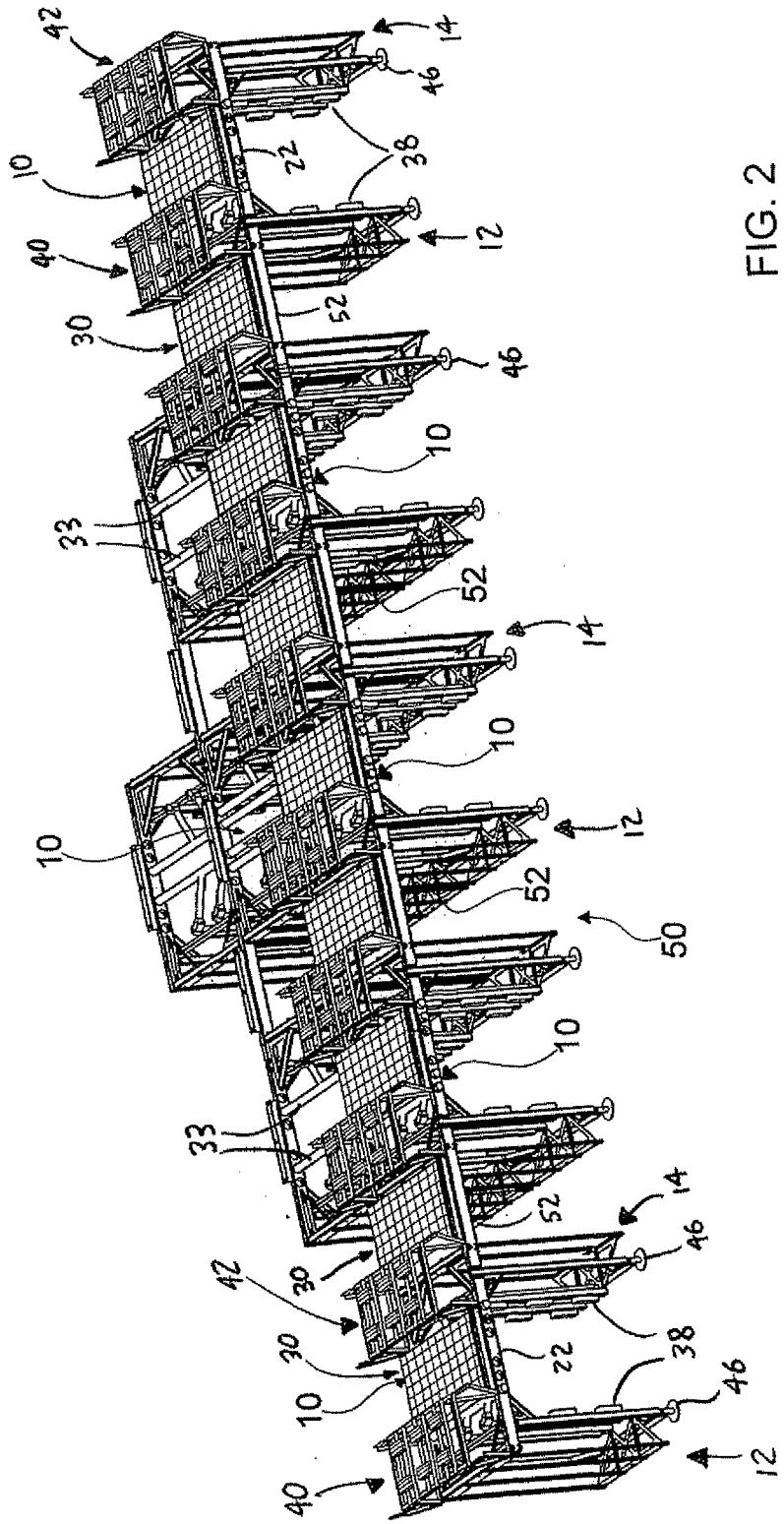
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FIG. 2

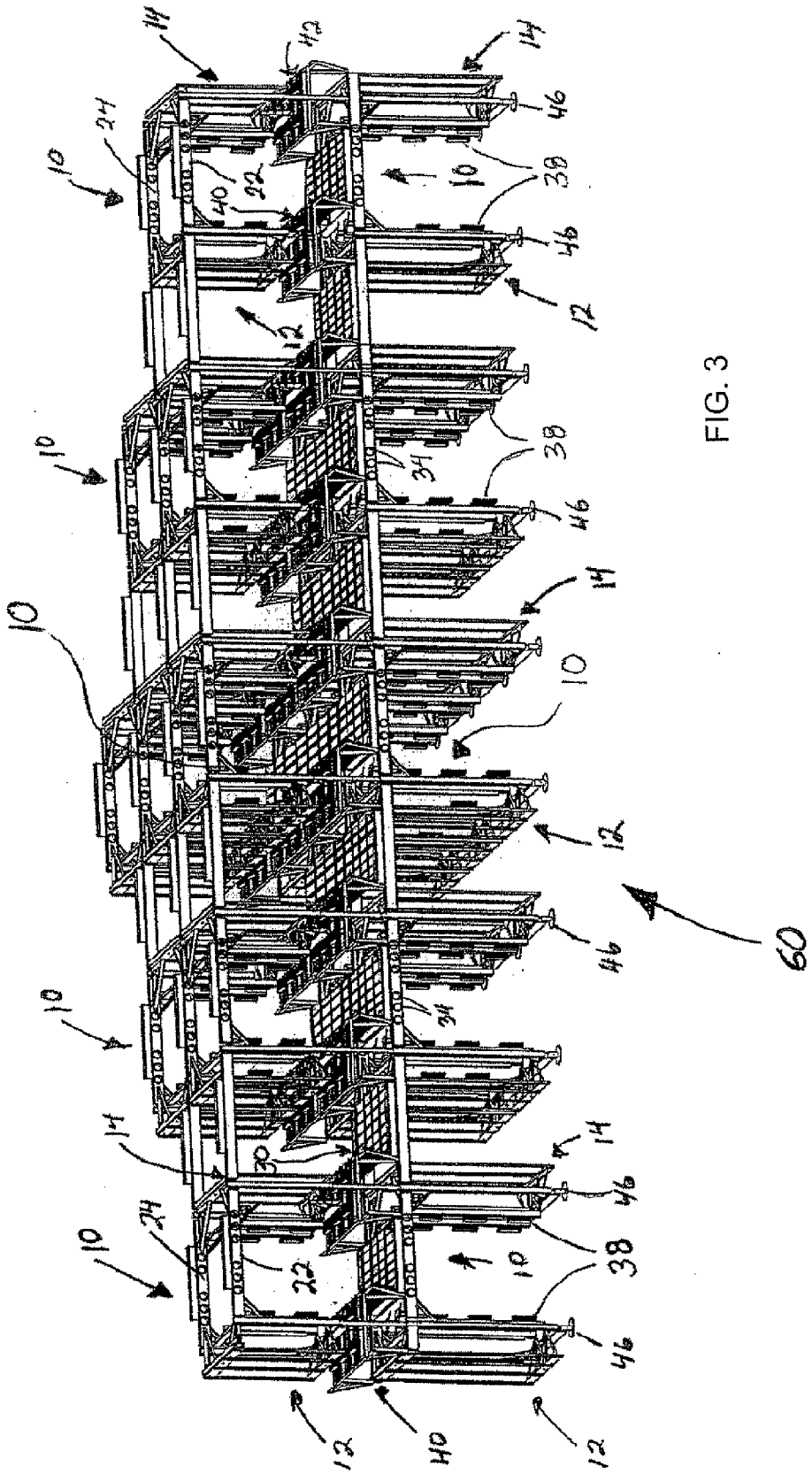
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FIG. 3

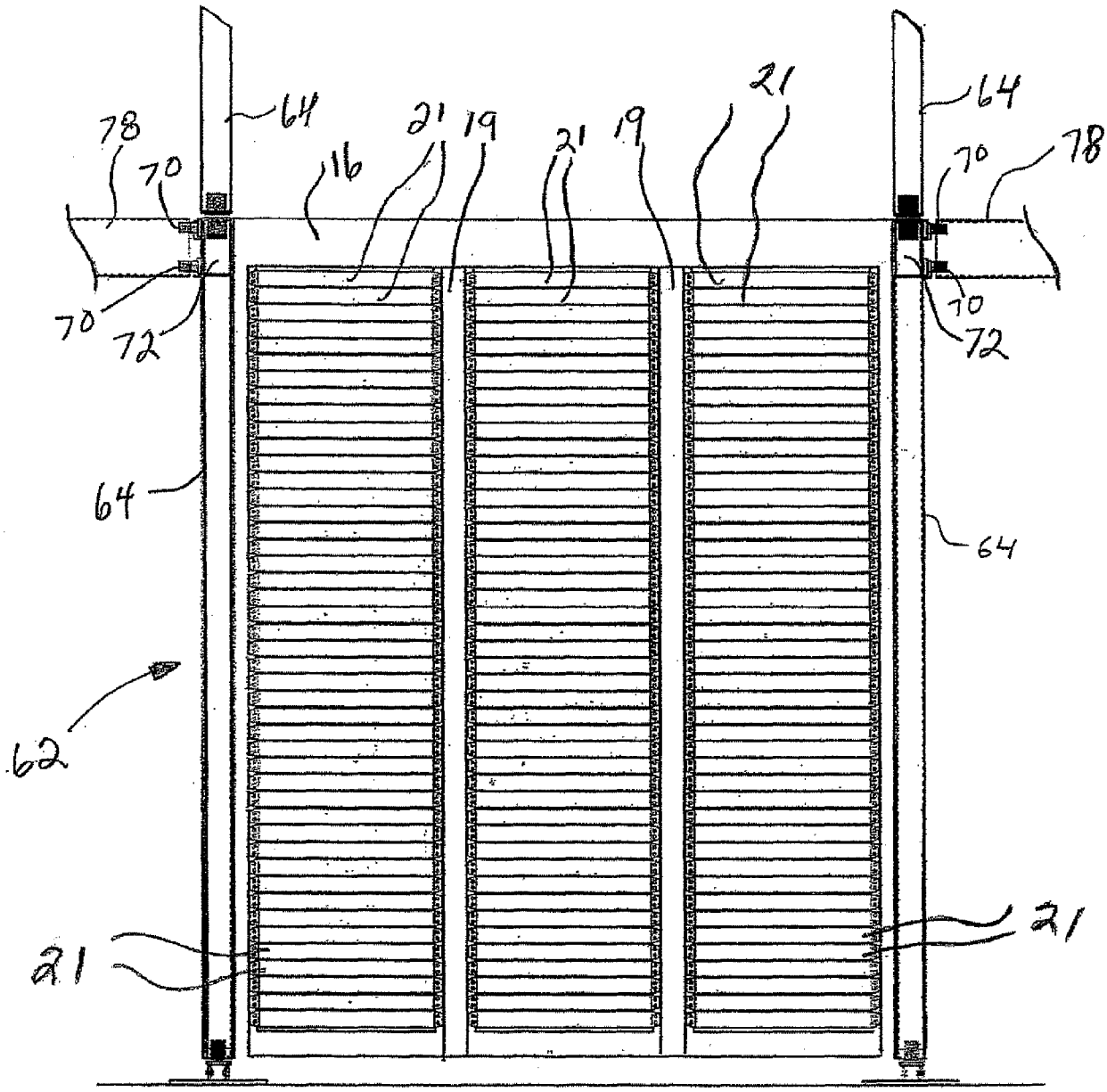

FIG. 4

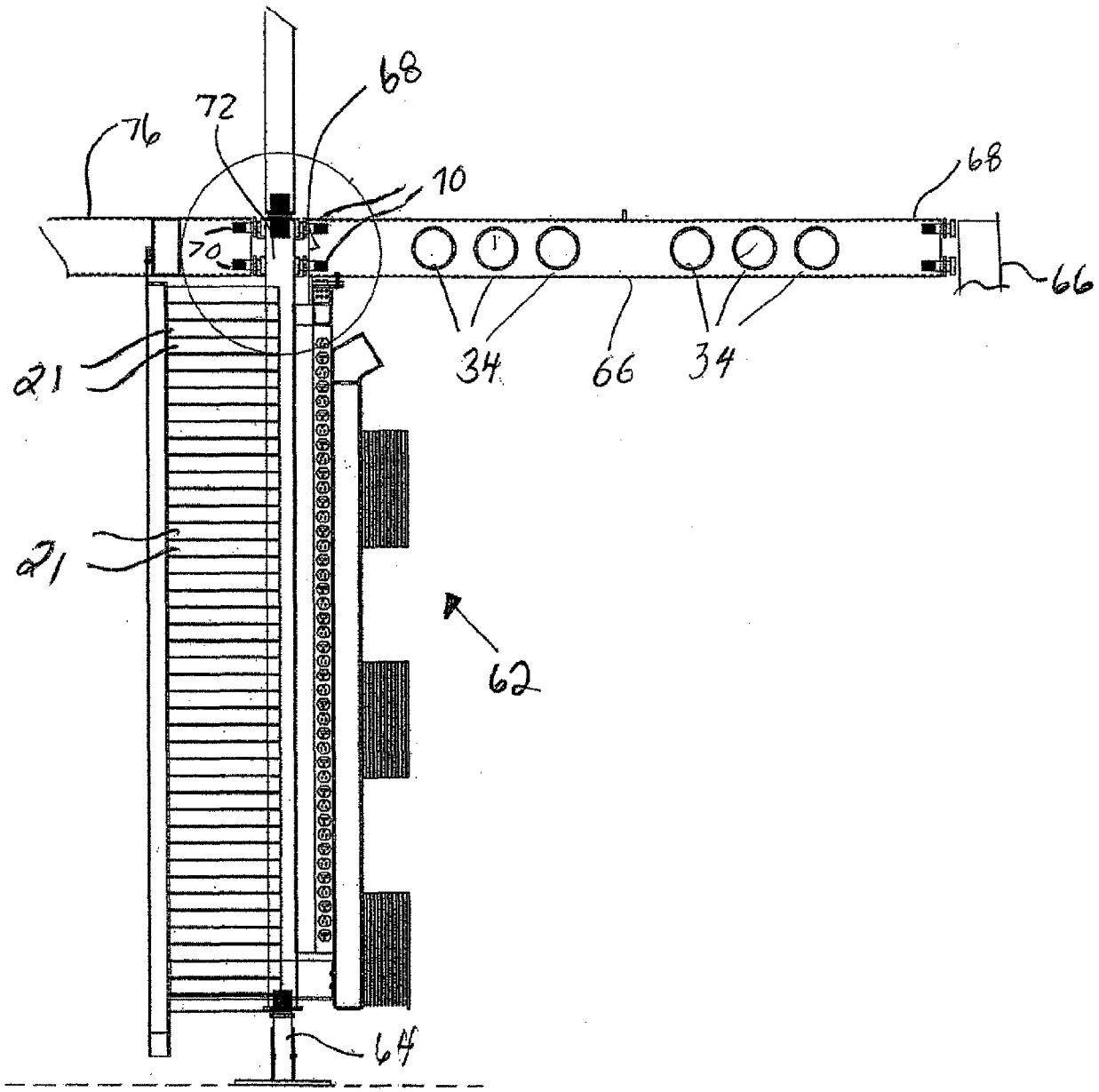

FIG. 5

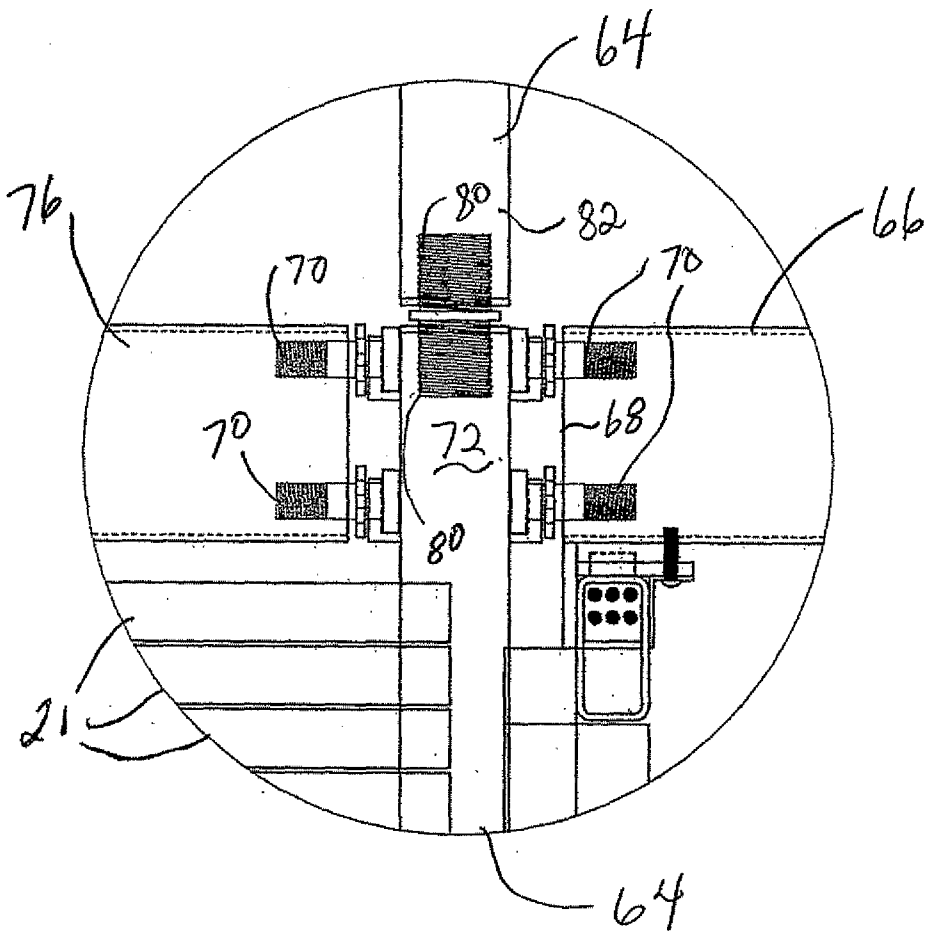

FIG. 6